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ABSTRACT

Theories relating to proposed improvements in education are discussed. Changes in curricula, contributions of fields such as psychology, and issues currently being debated are given consideration. Innovative models and approaches are proposed, and several interesting speculations are offered related to the future of education. Following the discussion of theory, a number of currently used programs are described. Among them are The Baldwin Whitehall School experiment with individualized instruction in Pennsylvania, the Texarkana/Dorsett performance contract, educational TV systems in El Salvador and the Ivory Coast, an open university in Great Britain, and a systems approach to reforming Indonesian education. Several proposals for improving teacher education are included in the final section along with the mention of programs already in existence. (MS)

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NEW DEVELOPMENTS IN EDUCATION FOR THE SEVENTIES

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There are specialists these days who call themselves futurologists; they believe that they can put together trends of today and of the recent past in order to predict with some accuracy what the world will be like in years hence.

I do not, today, intend to try to predict precisely what education will look like in any country during the next ten years. But it might be entertaining to take a look at what people engaged in educational speculation are talking about today and what this might mean for changes in the future.

Some of the big issues are abundantly clear. Within each country, there is a clear demand for more education of a higher quality for all. Despite the phenomenal growth in educational opportunity during the past quarter century, despite the fact that many countries are spending more than a quarter of their national budgets on education, despite the fact that education is the largest single social expenditure in the budget of most governments, there is still widespread disenchantment with the way the educational enterprise goes about its business.

There is increasing concern as we enter the second development decade that the educational expenditure of governments does not contribute as fully as it should to economic and social improvement of each country. In many countries, dropout, repeater, and wastage rates are

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so high that it takes the equivalent of fifteen or more years of classroom space and teacher effort for each student who finishes fifth or sixth grade. This means that in such systems, up to two-thirds of the expenditure in primary schooling is largely wasted.

In many systems, only a small fraction of teachers can be considered qualified by modern standards of teacher training and preparation. And that small fraction is usually found in urban areas, leaving the rural areas with teachers who cannot get jobs in the cities. And yet many nations are staking their future on the development of rural areas, on the improvement of agricultural industries,on the eighty percent of their people who live in rural communities.

All countries are concerned that the curriculum may not be relevant to the needs of the students nor of the country. Curriculum changes slowly and still deals too much with memorization of the past when it should be dealing with the behaviours necessary to mold the future. Probably a third of the technical specialities performed by workers in an industrialized country did not exist twenty-five years ago. As many as one-half the technical specialities which will exist in the early years of the next century do not exist today. Yet we must teach students now who will be at the peaks of their careers in the first quarter of the next century. What should we teach children that will prepare them to prepare themselves for work that does not yet exist?

Whatever we teach, there is some suspicion that we teach it poorly. Some psychologists claim that it should be possible to teach a twelve-year old child in six months everything that most children learn in the previous six years. Others say we start too late - that children easily can learn to read at age twelve level before they are six years old. Others tell us that education should start at birth or even before the child is born.

These extreme positions may not be incompatible. There may be new teaching and learning methods and ways or organizing the teaching and learning environment so that many children can progress far beyond what is normally required at each educational level. Certainly, much of what happens to a child in the course of a school day hardly can be said to contribute to productive educational goals. And certainly much can be done to make learning more pleasant and satisfying so that children will be eager to progress rapidly.

Whatever we teach, however we teach it, and whatever the physical facilities may be, there is concern that opportunity is limited to children who are lucky enough or motivated enough to go to school when they are young. Life-long education is the key-word of the future. But life-long education is, so far, simply a good idea wrapped in rhetoric. What kind of new educational centre will we need to cater to the needs and interests of people of all ages? What kinds of new teaching and learning resources will these centres have? The variety of functions and approaches of such institutions will require total re-thinking of what an educational centre looks like and radically new kinds of staff to run them.

Finally, most countries are worried about the way we plan our education and the way we manage what we plan. Some have said that most industries would be bankrupt if run as education systems are run. Many educational planning offices are low-level statistical units, keeping records that should be done by a clerk. The business of building models of what alternative systems of the future might look like, and of the kinds of sophisticated yet feasible approaches, we must begin making now to get there, seems to confound the planners as much as anyone else.

On the management side, school systems range from total delegation of authority and near anarchy to no delegation. Some school administrators spend all their time trying to avoid small mistakes. Some school supervisors worry about keeping books locked up, but tolerate impossible teaching.

Certainly, there is little dynamism in most educational management.

These and similar issues are on the mind of us all. Innovation and change are the by-words of the day. We are not without ideas as to things that need changing in education, but we are a long way from having truly innovative and feasible new models of what education should look like and the tough business of knowing how to get innovation moving in school systems.

Let us explore some of the contemporary bright ideas and meditate together as to how these will affect education in the '70"s.

For generations we have been exhorting teachers to set goals and objectives and then to teach towards these goals and objectives. Only within the last decade or so, however, have psychologists and educational technologists forced educators and academicians to begin defining more specifically the behaviours we are trying to teach in school. This has forced great attention on the individual student, with parallel stress on individualized rather than group-based instruction. We are all now familiar with the assertion of the behavioural psychologist that if the student does not learn, it is not the fault of the student, it is the fault of the teacher or of the educational system.

To one degree or another, we all accept this basic principle. The question is how, in a mass system of education, can you create the kind of learning-teaching environment in which at least the basic skills, attitudes and knowledge we wish to teach are specified in great detail, and in which each individual can have an infinite variety of alternatives so that he can learn in his style and at his own speed?

Specialists in innovation and institutional change are calling for the system to modify itself to accomodate performance expectancies rather than time expectancies for programme completion. What this means is that if we are going to teach towards specific behavioural objectives and in way so that the student can proceed at his own pace, we must structure the system to keep track of when the student has acquired each behaviour. It is not relevant to talk in terms of so many years of maths, language, science or what have you. Obviously, traditional concepts of how we test, evaluate and store information on each student's performance are largely irrelevant in a performance oriented approach.

A number of prototype models suggest that courses be broken up into dozens or hundreds of task units, each of which has built-in evaluation. A student can perform each task unit in any way he wishes, through individual study, listening to lectures or using programmed instruction materials and when he can demonstrate that he has successfully completed the task, this is noted. In the aggregate, this would mean that a degree or certificate at any educational level would no longer indicate a certain number of years in school, but rather the successful completion of task units relating to specifically defined knowledges, skills and attitudes.

Such basic thinking is significant also when education is considered as a life-long activity. Many students are not interested or ready for everything in an educational curriculum which is organized in blocks of time and by ages of the students. Often, after a number of years, they wish to return but re-entry into the system is difficult by then. If, however, educational opportunity were defined in terms of task units rather than number of years spent in a classroom, and if learning experiences were programmed in such a way that students could enter the system at any point and proceed at their own pace, children or adults of any age could easily re-enter the system at any time.

The average teacher might say that all of this is highly impractical under the conditions in which we teach. And the average teacher is right. Under present constraints in many school systems, the teacher is on his own with whatever resources he can muster out of his own ingenuity. He is also locked into a system with a set syllabus, set examinations, and a time schedule in the school which allows little flexibility. Even the information system to keep track of student progress is so limited that the teacher either at the beginning or at the end of the year, may have little idea of the individual capabilities or interests of each student in the class.

In essence, if education is to move in the direction of a learner-centered approach there must be great changes in each piece of the system so as to provide the resources with which the teacher and the students can work. Each apparently simple basic change may have broad implications. Basic changes in the examination systems, for instance, so as to make possible continuous cumulative evaluation, based on the

completion of task units, would involve changes in everything from legislation to record-keeping in may school systems.

If the concept of something like the task unit were to be accepted, this would mean significant new investment in the design, development, testing, reproduction and distribution of new types of basic teaching materials of all kinds. This, in turn, requires new approaches to automated storage and retrieval systems so that teachers and students could get access to a variety of teaching materials in different forms in such a way as to facilitate learning.

Such an approach would imply considerably more sophisticated management than now employed in most school systems. Financing and budgeting of such new educational strategies would be very different than those now used. Something similar to what management specialists call PPBS; planning, programming, budgeting and scheduling procedures, would have to be used. This approach, first used in industry, stresses the detailed planning of objectives and goals, the measurement of the output of the system and the control of cost needed to achieve output. It focusses on the budget and decision-making processes, particularly on problems relating to resource control, allocation and use.

It also implies networking (PERTing) of what has to happen in each stage of the instructional process and how each feature of the system affects other features. Finally, it implies at least three dimensional accounting; by activity (for example instruction), by materials or services required (for example salaries), and by programme area or subsystem (for example: social studies). In this way, an administration can have better data on performance of the overall system.

So far, it appears that a comprehensive new approach to instruction stressing task units, new instructional strategies and new management would likely cost up to a third more per student enrolled than we are now spending for traditional kinds of education. There is some indication, however, that productivity would increase by more than one-third in terms of quality, retention of the system, and assurance that we are teaching the students what we say we want to teach them. In essence, it would cost us more for each student enrolled in school, but less for each student successfully acquiring specified skills, knowledges and attitudes which are the objectives of the school.

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So that we don't talk all theory, let us look at what is actually happening in a variety of countries. Significant trends can be seen in both rich and less rich nations. In the United States there are fascinating developments. The Baldwin Whitehall School experiment near Pittsburgh Pennsylvania, in collaboration with the Learning Research and Development Centre at the University of Pittsburgh, is one of the early attempts to develop a system of completely individualized instruction in one school system. This has involved changing traditional school schedules, developing completely new curriculum materials that can be used by students on their own or with the guidance of the teachers, new testing procedures so as to provide feedback to the student and to the teacher as each task unit is completed, and a new management system in order to keep track of the resources which are necessary and so as to judge the cost effectiveness of the programme.

Another novel concept in the United States in the performance contract. Thus, Texarkana, a city on the Arkansas-Texas border, recently contracted with a consulting firm for a five-million dollar programme to improve reading and mathematics skills among its students so as to prevent dropouts. It was thought that the high drop-out rate was in large part due to the inability of students to read and to do the necessary mathematics related to the various subject matter areas.

The firm established teaching-learning centres in conjunction with the regular school programme and will receive about eighty dollars per student per grade-level increase in mathematics or reading if this can be done in no more than 80 hours of instruction. If the increase is achieved with less time, the company gets a bonus. If it takes more than 80 hours per student the company is penalized and if it takes over 160 hours to raise the student one grade level, the company gets no payment at all.

The core of the programme consists of self-study software, basically instructional film-strips and recordings which are presented in a display device which looks something like a television set. The device itself has a simple computer-like control system and the teaching materials are constantly changed and revised with experience.

So far, the results of this experiment are highly promising. Although there is considerable investment in the system, it shows that with careful development and testing of instructional approaches, students with learning difficulties in the regular system can be brought up to the norm, often in less time than is taken in a normal classroom by the average student. It also squarely states that if the student does not learn it is the fault of the instructional environment and not the student, and the company gets paid nothing

if its system does not teach. How would you like to get paid only for the students that learn?

At the national level, there are interesting developments afoot affecting entire educational systems. In El Salvador, several years ago, the Minister of Education elected to introduce a massive system of educational television, not as another layer on the traditional system but as a piece of a total educational reform effort. The concept has been to use television as a catalyst for change and as new television courses are developed, these often introduce new curriculum approaches. Often, the teachers learn the new approaches with the students from the television sequence and from the supplementary materials which are distributed to be used before and after the television broadcasts. In addition, the television programming is linked closely to the national secondary teacher training college which prepares teachers who will then understand the use of the new medium.

Television is also being used as a catalyst for overall educational reform in the Ivory Coast. Here again, a complete reform of the elementary system is under way and the changes in content and approach will be introduced rapidly in television. The television software, that is the programmes, will be produced at a Centre adjacent to the national teacher training college which will be located in a predominently rural area. In this way, it is anticipated that the curricula will take on more of a bias appropriate to rural areas and the teachers trained in the teacher-training college will be more motivated to stay in rural areas and teach.

Feasibility studies have been done or are under way on the possible uses of satellite in education in India, the Spanish-speaking countries of Latin-America, Brazil and Africa. There is no question that satellites are capable of broadcasting something over wide areas, but it is not entirely clear whether or not there will be much real impact on instruction. In part, this is because the trend in education is away from having all students do the same thing at the same time and in part because of the conceptional problems of getting school systems in widely scattered areas and often in different countries to accept the same curriculum and materials. However, there will be great uses for satellites in adult education, in bringing supplementary material to schools, in the exchange of information and in the linking of computer-based information storage and retrieval systems in universities and research institutes in various countries.

Britain has introduced the Open University which may completely revolutionize the concept of how we go about university education. The concept here is to provide a variety of learning and teaching experiences by the broadcasting medium, through self-study material, seminars and classes organized to suit the convenience of students. Evaluation will be based on the assessment of fairly specifically defined knowledges, skills or attitudes. A degree will not be based on number of years spent in the institution but rather based on completion of learning tasks and a student may never be in residence anywhere and still get a university degree. It is likely that the per-student cost of this university will be less than a traditional university and yet its enrolment is potentially infinite. However,

sophisticated approaches to the preparation of teaching learning materials, evaluation, and management must be brought into play in order to make it work.

Indonesia is probably one of the first countries to attempt a true systems approach to the reform of education at all levels. Under a UNESCO Special Fund Project, a consulting firm is assisting the Government in designing a systems approach to the development of the components necessary in the total educational environment and the UNESCO Chief Technical Adviser is a systems management expert with a great deal of industry experience. Components of the system will include a curriculum research and development centre, new kinds of testing and evaluation approaches and probably a broadcast component tailored specifically to the peculiar need of Indonesia with its many islands. All will be melded together with the programme, planning, budgeting and scheduling procedures and PERTed so that the whole will proceed smoothly during its reform and later stages. How this will work nobody knows, but hopefully the system will include plenty of feedback so that we will know what is successful and why and what does not work, and why.

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These broad trends place great emphasis on the development of a number of specialized infrastructures and institutions in the education system that have not traditionally existed in many countries. Perhaps basic is the trend toward the establishment of curriculum research and development organizations which are staffed with people who know how to get academicians to define in behavioural terms what it is that

is important in each discipline, specialists who know how to develop new kinds of teaching and learning materials which make possible new approaches to group and individualized instruction and specialists who can then put it all together in a strategy that can be managed within the financial resources available now and in the future.

Those centres also will look at new kinds of curriculum needs dealt with now only superficially if at all. For instance, what should we be teaching students so that they will have the knowledge, skills and attitudes necessary:

- to be productive without poisoning the environment?
- to understand the role of population in shaping the world and the possible role of their families in contributing to problems of over-population?
- to participate productively in the affairs of man that contribute to peace and international understanding?

Many of these and other contemporary problems will demand inter-disciplinary treatment and new kinds of insights in terms of teaching approaches.

Finally, these centres will likely be worried about teaching and learning styles. What are the special learning problems of children from a culture less than rich in abstract stimuli? What are the special problems of children of one language group who must learn in a school which uses a second, perhaps national, language?

Another set of sub-institutions, very closely related to the curriculum group, will have to do with educational technology. What are the kinds of systems appropriate and economically feasible for getting new kinds of instructional materials to the classroom? This

can include certain kinds of mass distribution of instructional material via television or it can include programmed instruction materials, 8 mm film, new kinds of work books, new strategies such as correspondence study, and so on. All of these new technologically-based approaches involve specialist fields and administrative and organizational structures in order to get the software developed and tested, and in order to get it distributed, stored and used in a continuously involving system. Certainly libraries and audio-visual centres of today are unlike the kinds of dynamic systems of storage, retrieval and display we will see during the next decade or two.

New kinds of testing and measurement organizations will be established in order to keep continuous record of performance and abilities of students. Again, this is intimately related to the curriculum and technology infracstructures which will be appearing in various countries.

New kinds of school management structures will be emerging with sophisticated and new approaches to the collection of data about schools, student flow, teacher preparation, school scheduling, and school budgeting. This is closely related to the new breed of educational planners who are staffing the educational planning offices in most countries. These offices, more and more, will be using sophisticated techniques for global assessment of various alternate approaches to improving the quantity and quality of education.

New kinds of educational research institutions are being established in many countries to assist all parts of the system in finding answers to critical teaching and learning problems. One such centre,

more elaborate, was originally described as a mile-long continuum, with basic research on learning phenomena at one end and applied applications in school systems at the other end, with all shades and combinations of basic and applied research down the middle.

Where is the teacher in all this? I think that it is obvious that the rôle of the teacher will gradually change over the next decades. No longer will the teacher be thrown into a classroom to fend for himself. He will have an arsenal of sophisticated teaching, learning and evaluation materials available in the school, and his job will be more and more to articulate and orchestrate large numbers of resources which he does not now have. All kinds of specialist skills will be needed of him, and it is likely that he will assist and be assisted by other specialists. I think that the prospects are bright for a profession which is much more satisfying than ever before in that there will be much clearer definitions of what we are trying to do and much improved resources with which to do it.

There obviously will be re-distribution of functions which are now all performed by the teacher in a self-contained classroom. There will be team approaches to planning and teaching. There will be much more peer-teaching, that is, students planning their own studies and helping each other learn. Specialist administrators will be facilitators, members of the teaching team, providing the resources needed for teaching rather than inspectors and supervisors who act as policemen and warders.

The environment in which the teacher works should be greatly improved in the next decade. Rather than egg-crated types of schools with a standard number of chairs and limited teaching equipment in each

classroom, schools will gradually turn into teaching and learning centres with flexible space and with resources which will gradually move the school toward the concept of being a community centre of life-long education. There will be examples during the next decade of schools which work 18 hours a day, with teaching, learning, cultural and re-creational activities available to the entire community. If there is such a transformation, it will certainly enrich the environment for young students who are in the part of the new institution which we now call formal schooling, and it will bring the school back to the community, where it belongs.

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One of the basic problems in all of this is qualified manpower. We must turn our efforts in teacher education institutions and in in-service education to the preparation of a variety of specialists who can be the innovators of the future, who can staff the new strategies of education. We must turn our attention to the preparation of teachers who have the definable skills necessary to take leadership in innovation andwho can work in a team which includes many specialists. We must turn our institutions to more research and development in curriculum, educa-tional measurement, school management. We must take the relevant of management disciplines, of the social sciences and of academic disciplines, and mesh these various relevancies into a total systems approach to educational renewal.

Fascinating examples of diversity in teacher education institutions are abundant. In a number of countries, there is a great interest in micro-teaching, inter-action analysis, analyses of non-verbal behaviour and other approaches designed to identify and teach the teacher those

behaviours which will facilitate learning. Often, closed-circuit television is used to help the teacher-in-training to analyse his own behaviour.

Academies of pedagogy and of teacher education are now being created in a number of countries where teacher educators, school administrators and educational specialists are being trained for the first time. UNESCO assisted Academies exist in Afghanistan, Ethiopia and other countries. Many of these institutions will use various techniques for reaching teachers in-service: television, radio, correspondence education and the like. In Laos, a new Higher Teachers College will not only train secondary school teachers, but prepare programmed instruction material for use in secondary schools of the country. Teachers in-training will participate in this work and thus be prepared to use the material when published.

In India, a National Council for educational Research and Training has an integrated complex of curriculum and materials development projects, programmed instruction and educational technology activities, educational research programmes, and advances training in these and other specialities. Now it is planning to produce educational materials for use by satellite, probably beginning in 1974.

Spain has, with UNESCO advice and assistance, begun the first extensive programme to use computer-assisted instruction in teacher education. A number of the larger centres of teacher education will experiment for the next several years with the programming of much of the teacher-education content so that students will inter-act with material stored in the computer.

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Clearly, the 70's will be a decade of change and innovation in the various professions concerned with teaching and learning. Teachers, educators and specialists of 1980 surely will be part of a substantially new educational environment.

All of us, in our various specialities, must seek to find the new structures necessary to contribute most effectively to the whole. Librarians will become managers of learning resource centres. Audio-visual specialists will become learning-teaching technologists, expert in the preparation, testing and production of new kinds of teaching-learning systems and materials. Teachers will become orchestrators of many new resources not now available. Administrators will become systems analysts who can put all the pieces together so that the whole is more than the sum of its parts. Researchers, guidance counsellors, reading specialists and others will cement the various pieces together with their skills and know-how.

How to develop each speciality so that it contributes effectively to the whole is the task of the future. We must clearly demonstrate that we are capable of systematic innovation, compatible with the accelerated pace of change in the world about us. To make haste wisely, so as to prepare citizens for the world of tomorrow and not of yesterday, is the challenge of the 70's.